

## PATENT ABSTRACTS OF JAPAN

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(54) PRODUCTION OF DIRECTION SELECTIVE RAY ADJUSTING SHEET

(57)Abstract:

PURPOSE: To rapidly and easily produce the direction selective ray adjusting sheet provided with rugged lines for ray adjustment consisting of various kinds of line group patterns on a film base material with good accuracy.

CONSTITUTION: The rugged lines 5 for ray adjustment are formed by using a roll intaglio 1 formed with plate recessed parts 6 consisting of shapes for molding these rugged lines, packing an ionizing radiation

curing type resin 3 into the plate recessed parts 6 of this roll intaglio 6, bringing the film base material 2 into contact with the intaglio, irradiating the base material with ionizing radiations 7 while the base material maintains contact with the intaglio to cure the resin interposed between the base material and the intaglio and to tightly bond the resin with the base material, then peeling the base material tightly bonded with the cured resin from the intaglio and coloring the rugged lines formed in such a manner.

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#### CLAIMS

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[Claim(s)]

[Claim 1] It is the approach of manufacturing the direction-selective beam-of-light adjustment sheet which prepared the concave protruding line for beam-of-light adjustment which consists of a track group which combined the detailed parallel straight-line group, the parallel-curves group, or them which were colored on the film base material. The roll intaglio in which the version crevice which consists of a configuration for size enlargement of the above-mentioned beam-of-light adjustment

concave protruding line was formed is used. Even if there are few these roll intaglios, while making a version crevice fill up with ionizing-radiation hardening mold resin, a film base material is contacted. After stiffening the above-mentioned resin which irradiates ionizing radiation and intervenes between a base material and an intaglio and making this resin and a base material stick, while this base material touches the intaglio, The manufacture approach of the direction-selective beam-of-light adjustment sheet characterized by manufacturing the base material which the hardened resin stuck by coloring it the concave protruding line which exfoliated from the intaglio and was formed subsequently to a base material top.

[Claim 2] It is the approach of manufacturing the direction-selective beam-of-light adjustment sheet which prepared the concave protruding line for beam-of-light adjustment which consists of a track group which combined the detailed parallel straight-line group, the parallel-curves group, or them which were colored on the film base material. The roll intaglio in which the version crevice which consists of a configuration for size enlargement of the above-mentioned beam-of-light adjustment concave protruding line was formed is used. Even if there are few these roll intaglios, while making a version crevice fill up with the ionizing-radiation hardening mold resin of coloring agent content, a film base material is contacted. After stiffening the above-mentioned resin which irradiates ionizing radiation and intervenes between a base material and an intaglio and making this resin and a base material stick, while this base material touches the intaglio, The manufacture approach of the direction-selective beam-of-light adjustment sheet characterized by manufacturing the base material which the hardened resin stuck by exfoliating from an intaglio.

[Claim 3] It is the approach of manufacturing the direction-selective beam-of-light adjustment sheet which prepared the concave protruding line for beam-of-light adjustment which consists of a track group which combined the detailed parallel straight-line group, the parallel-curves group, or them which have the split-face part from which an optical property differs at least on the film base material. The roll intaglio in which the version crevice which consists of a configuration which has the detailed concave convex section at least in order to carry out size enlargement of the above-mentioned \*\* for beam-of-light adjustment irregularity was formed is used. Even if there are few these roll intaglios, while making a version crevice fill up with ionizing-radiation hardening mold resin, a film base material is contacted. After stiffening the above-mentioned resin which irradiates ionizing radiation

and intervenes between a base material and an intaglio and making this resin and a base material stick, while this base material touches the intaglio, The manufacture approach of the direction-selective beam-of-light adjustment sheet characterized by manufacturing the base material which the hardened resin stuck by exfoliating from an intaglio.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the manufacture approach of a direction-selective transparency sheet that the degree of transparency of incident light or reflection and its condition change with the directions which carry out incidence.

[0002]

[Description of the Prior Art] The following is known as a direction-selective beam-of-light adjustment ingredient which the incident light is reflected and absorbed by the include angle of the beam of light which carries out incidence, or is penetrated, and is variously adjusted with it. for example, the thing which gave the polarization property by coming to constitute using liquid crystal and adjusting the shaft orientations of this liquid crystal molecule by electric field -- many -- there is an ingredient obtained by slicing the layered product to which the laminating of the transparency sheet of several sheets and the coloring sheet was carried out by turns in the direction of a laminating. However, it is expensive, and the directions of the former are also complicated and it needs complicated processing for versatility being missing and attaching a transparent electrode etc. Moreover, surface treatment processing for a production process being complicated, and taking time especially in a laminating activity, and cleaning a slice cut surface etc. was needed, and the latter thing could not but change with the expensive thing. Therefore, the beam-of-light adjustment ingredient of the simple structure which prepared the shape of toothing for adjusting a beam of light in the film base material is also proposed. After applying a photopolymer to a film base material on the whole surface, and it irradiates ultraviolet rays where striped NEGASUKURIN is installed on the spreading side, and ultraviolet rays are not irradiated but specifically flushing and removing a non-hardened photopolymer part,

only the hardened resin part is colored. However, this has difficulties, like although a production process is simplify compared with the ingredient which slices what carried out the laminating of the above-mentioned transparence sheet;and the coloring sheet, and is obtain, the configuration of the irregularity which consists of a resin part into which complicated processes, such as carry out washing removal, still remained, and hardened the non-harden resin part is not what can be satisfy in precision. In addition, there is an ingredient which established the shape of toothing which gravure, screen-stencil, etc. heaped up to the film base material, and colored it with the printing means. Although this was easy to manufacture, since leveling of the ink transferred to the base material at the time of printing arose, there was a problem which the shape of toothing finally acquired serves as an indeterminate form, and the shape of desired toothing is not acquired with a sufficient precision, consequently the effectiveness of directional selectivity is stabilized and is not fully acquired. This invention was made in view of the fault of the above-mentioned conventional technique, and as an approach of manufacturing the direction-selective beam-of-light adjustment ingredient of the structure which prepared the irregularity for beam-of-light adjustment in the film base material, when the irregularity can be formed especially that it is simple and with high precision, it aims at offering the manufacture approach of the direction-selective beam-of-light adjustment sheet which can be mass-produced quickly also on the whole easily.

[0003]

[Means for Solving the Problem] The manufacture approach of the direction-selective beam-of-light adjustment sheet of this invention It is the approach of manufacturing the direction-selective beam-of-light adjustment sheet which prepared the concave protruding line for beam-of-light adjustment which consists of a track group which combined the detailed parallel straight-line group, the parallel-curves group, or them which were colored on the film base material. The roll intaglio in which the version crevice which consists of a configuration for size enlargement of the above-mentioned beam-of-light adjustment concave protruding line was formed is used. Even if there are few these roll intaglios, while making a version crevice fill up with ionizing-radiation hardening mold resin, a film base material is contacted. After stiffening the above-mentioned resin which irradiates ionizing radiation and intervenes between a base material and an intaglio and making this resin and a base material stick, while this base material touches the intaglio, It is characterized by manufacturing the base material which

the hardened resin stuck by coloring it the concave protruding line which exfoliated from the intaglio and was formed subsequently to a base material top. Moreover, it is characterized by for this invention manufacture approach replacing the coloring with the coloring means of the above-mentioned manufacture approach, and performing it with the application of the thing which made the coloring agent contain as ionizing-radiation hardening mold resin with which a version crevice is made to fill up, when manufacturing the direction-selective beam-of-light adjustment sheet which prepares the colored concave protruding line for beam-of-light adjustment. Furthermore, this invention manufacture approach is an approach of manufacturing the direction-selective beam-of-light adjustment sheet which prepared the concave protruding line for beam-of-light adjustment which consists of a track group which combined the detailed parallel straight-line group, the parallel-curves group, or them which have the split-face part from which an optical property differs at least on the film base material. The roll intaglio in which the version crevice which consists of a configuration which has the detailed concave convex section at least in order to carry out size enlargement of the above-mentioned \*\* for beam-of-light adjustment irregularity was formed is used. Even if there are few these roll intaglios, while making a version crevice fill up with ionizing-radiation hardening mold resin, a film base material is contacted. After stiffening the above-mentioned resin which irradiates ionizing radiation and intervenes between a base material and an intaglio and making this resin and a base material stick while this base material touches the intaglio, it is characterized by manufacturing the base material which the hardened resin stuck by exfoliating from an intaglio.

[0004]

[Example] Hereafter, the example of this invention is explained based on a drawing. Drawing 1 is the process explanatory view showing an example of this invention manufacture approach, in one in drawing, a roll intaglio and 2 show a film base material, and 3 shows ionizing-radiation hardening mold resin. An example of the direction-selective beam-of-light adjustment sheet 4 obtained by drawing 2 by this invention approach is shown, and this beam-of-light adjustment sheet 4 consists of a film base material 2 and a concave protruding line 5 for beam-of-light adjustment fundamentally. this invention approach prepares the roll intaglio 1 which carried out templating of the version crevice 6 which consists of a configuration for allocated-type-forming the concave protruding line 5 for beam-of-light adjustment in a direction-selective beam-of-light adjustment sheet first, for example, installs and uses it

like illustration. The inside 20 and 21 of drawing is the roll intaglio 1, the press roll installed in a pair, and a delivery roll, and its path clearance adjustment etc. is possible for both rolls.

[0005] Subsequently, to the above-mentioned roll intaglio 1, suitably, with a migration means, the film base material 2 is supplied so that this intaglio side may be contacted. this, simultaneously ionizing-radiation hardening mold resin 3 -- an intaglio 1 -- it supplies with a means suitably that the version crevice 6 should be filled up at least. And you make it stick to a base material side at the same time it stiffens the above-mentioned resin which irradiates ionizing radiation with ionizing-radiation irradiation equipment 7, and intervenes between a base material 2 and an intaglio 1 while the base material 2 touches the intaglio 1. The base material 2 which the hardened resin stuck after an appropriate time is exfoliated from an intaglio 1. Of this exfoliation, the \*\*\*\* protruding line 5 for beam-of-light adjustment by which size enlargement was carried out with the roll intaglio 1 is formed on a base material 2. And by coloring to the concave protruding line 5 prepared on the base material 2, the direction-selective beam-of-light adjustment sheet 4 equipped with colored concave protruding line 5a for beam-of-light adjustment like drawing 2 is obtained. In addition, like instantiation, as a thin resin layer is in a crevice 8 like instantiation at drawing 2 (A), even if it forms the concave protruding line 5, it may be formed in this drawing (B) in a crevice 8 so that there may be no resin layer.

[0006] Coloring of the concave protruding line 5 is performed by a color's etc. dyeing or preparing a coloring layer with a spreading means suitably on the field of a concave protruding line. as a color -- an oil color, a disperse dye, cationic dye, and reactive dye -- direct dye -- \*\* -- it \*\*\*\*\*. Moreover, by this invention approach, coloring of the concave protruding line 5 is replaced with the above-mentioned coloring means, and it carries out to allocated type formation and coincidence of a concave protruding line by supplying the resin to a roll intaglio using the ionizing-radiation hardening mold resin which made the well-known pigment, the color, etc. contain. In the latter coloring approach, since coloring is performed to allocated type formation and coincidence of a concave protruding line, it is easy, and moreover, it is advantageous also in respect of productive efficiency. It is usually carried out so that it may differ from the color of the film base material 2, but the contents of coloring of this concave protruding line 5 may color suitably, and may be performed so that it may become a color which is mutually different in a concave protruding line in addition to

it, or different concentration.

[0007] According to the beam-of-light adjustment sheet 4 equipped with concave protruding line 5a colored a different color from the base material 2 which was illustrated to drawing 2 For example, the light Y which carries out incidence in the range whenever [ incident angle / which penetrates the light X which is within the limits whenever / incident angle / which passes through the crevice 8 of a concave protruding line directly in the case of the mode which a base material 2 is transparent and is used as a sheet for transparency /, and carried out incidence at the rear face as it is through a base material 2, and passes along the heights 9 of a concave protruding line on the other hand ] is colored altogether, and extinction is carried out. The direction of the beam-of-light adjustment sheet 4 which prepared concave protruding line 5a without a resin layer especially in the crevice 8 like drawing 2 (B) has the highly desirable modulation contrast of the beam of light by the direction.

[0008] Moreover, the direction-selective beam-of-light adjustment sheet 4 equipped with concave protruding line 5b for beam-of-light adjustment which has the split face 10 where other parts for a surface part and optical properties differ from each other as by performing same actuation to a part as a roll intaglio 1 with the application of what carried out templating of the version crevice 6 equipped with the detailed concave convex shows this invention to drawing 3 is obtained. the inside of two or more plane groups from which this constitutes the concave protruding line 5 -- at least -- a group -- it is applied in case the beam-of-light adjustment sheet equipped with the concave protruding line which makes a field a split face is manufactured. According to the beam-of-light adjustment sheet 4 equipped with concave protruding line 5b which established the split face 10 which was illustrated to drawing 3 for example, -- a base material -- two -- transparent -- transparency -- \*\* -- a sheet -- \*\*\*\*\* -- using it -- voice -- like -- a case -- concave -- a protruding line -- a split face -- ten -- passing -- an incident angle -- whenever -- within the limits -- it is -- incidence -- having carried out -- light -- P -- a split face -- scattered reflection -- carrying out -- having -- a sake -- extinction -- carrying out -- having -- on the other hand -- concave -- a protruding line -- a split face -- ten -- except -- a field -- 11 -- a passage -- an incident angle:-- whenever -- within the limits -- it is -- incidence -- carrying out -- light -- Q -- reflecting -- having -- a thing -- it is -- although -- The most is penetrated at the rear face as it is through a base material 2. In addition, the cross-section



configurations of concave protruding line 5b may be the shape of the shape not only of the thing of the shape of a triangle like instantiation but a polygon more than a square, and a hemicycle, half-elliptical, etc. at drawing 3 .

[0009] By this invention approach, since the above-mentioned concave protruding line 5 is fundamentally formed with the above manufacture (allocated type) means in [ any ] the mode, the shape of very clear toothing which reproduced faithfully the configuration which carried out templating to the roll intaglio is acquired, and even if the shape especially of toothing is the thing of a complicated and detailed configuration, it can obtain that it is simple and certainly. Moreover, the concave protruding line 5 which makes the gestalt to which a resin layer exists in drawing 2 (A) among heights 9 like instantiation (namely, crevice 8) is formed by filling up so that the ionizing-radiation hardening mold resin 3 supplied to the version crevice of a roll intaglio may intervene between the top face of not only a version crevice but an intaglio, and a base material 2. Therefore, what is necessary is to operate writing the resin on printing plates other than a version crevice with a doctor blade etc., and just to make it fill up only a version crevice with resin, in forming the concave protruding line 5 without a resin layer in the crevice 8 like instantiation at drawing 2 (B), after supplying the above-mentioned resin to a roll intaglio.

[0010] Means, such as the engine-lathe processing method by electronic sculpture, the etching method, mill push, electroforming, a numerical-control (NC) engine lathe, a milling machine, etc., can perform formation of the version crevice 6 in the roll intaglio 1 used for this invention. Formation of the version crevice 6 is a configuration that size enlargement of the shape of toothing of the concave protruding line 5 for beam-of-light adjustment should be carried out, and the crevice part of a version will carry out size enlargement of the heights of a concave protruding line in fact. Plates are metals, such as copper and iron, synthetic resin, etc., and plate chromium etc. on a front face if needed. It carries out to a roll intaglio by supplying by the direct roll coat method like this example, and also supply restoration of ionizing-radiation hardening mold resin may be performed by carrying out spreading formation by the roll coat method etc. beforehand on this base material, before it supplies from dies, such as a T-die method, or a base material 2 contacts the roll intaglio 1.

[0011] as the above-mentioned ionizing-radiation hardening mold resin, electron ray hardening mold resin including well-known ultraviolet rays

which consist of the prepolymer or monomer which has a polymerization nature unsaturated bond and an epoxy group, such as \*\*, urethane acrylate, polyester acrylate, and epoxy acrylate, can be used into a molecule. When the predrying process of this resin becomes unnecessary, without faults, such as a volumetric shrinkage by hardening, a form status change form, and gassing, arising if a solvent type thing is used especially, a concave protruding line with better repeatability becomes that it is easy to be obtained certainly. Moreover, the ionizing radiation to irradiate can use ultraviolet rays, when the film base material 2 is transparent, but when this base material is opaque, it needs to use an electron ray. Moreover, if a roll intaglio is constituted from an ionizing-radiation permeability ingredient, the exposure from the irradiation equipment installed in the interior of this intaglio will be attained. When using an electron ray, although the exposures differ more in the thickness of a sheet base material, the quality of the material, etc., its 0.5 - 30Mrad extent is usually desirable.

[0012] As a film base material 2, the film which consists of synthetic resin, such as acrylic resin, such as polyamides, such as polyester, such as polyethylene terephthalate, and Nunn Ron, a polyvinyl chloride, and a polymethyl methacrylate, a polycarbonate, polystyrene, polyarylate, fluoro-resin, polypropylene, a cellulose triacetate, cellophane, and a polyvinyl chloride, is mentioned. Although a base material 2 usually uses a transparent and colorless thing when using as a transparency sheet, it may be the thing of coloring transparency. moreover, the thing which added and fabricated concealment nature pigments of high reflexivity, such as a titanium white, to base material resin as a base material 2 in the case of using as a reflective sheet -- or the thing in which the metal vacuum evaporation layer was formed on the film front face, and the thing which carried out coating formation of the coatings containing photoluminescent pigment, such as pearl pigments, such as a titanium oxide covering mica, or a metal powder pigment, further are used. Conditions, such as thickness of a base material 2 and coloring, are suitably selected on balance, such as an optical element given to the concave protruding line 5.

[0013] In [ neither of ] the case of the modes, especially the cross-section configuration of the concave protruding line 5 is limited, but the thing of the gestalt which consists of two or more plane groups which make a different include angle to the front face of a base material 2 is desirable, considering the viewpoint of acquiring certainly the optical effectiveness by the directional selectivity of

permeability or a reflection factor. Specifically, a circle besides a triangle, a square, a trapezoid, and the polygon beyond it, an ellipse, etc. are mentioned. It may be irregular although the regular thing of the shape of these toothing is desirable. moreover, the track group which constitutes the concave protruding line 5 -- the top view -- drawing 4 (a) The detailed parallel straight-line group like instantiation, and drawing 4 (b) the detailed parallel-curves group like instantiation -- or drawing 4 (c) which combined them suitably It is the thing of the track group like instantiation. Parallel-curves groups may be wavelike parallel curves, such as not only a circle-like thing but a sine wave, etc. Moreover, drawing 4 (c) Although the track group of instantiation is made into the shape of a grid combining parallel-curves groups, as this combined track group, the combined thing of an parallel straight-line group and a parallel-curves group or the thing which combined parallel-curves groups is also possible. for example, drawing 4 (a) like -- in a track group, extinction (coloring) of the entering [ aslant ]-from longitudinal direction in drawing incident light can be carried out, or it can shade. moreover, drawing 4 (b) like -- in a track group, only the incident light from a perpendicular direction can be passed as it is to a drawing. furthermore, drawing 4 (c) like -- in a track group, extinction (coloring) of the incident light which enters aslant from right and left / upper and lower sides in a drawing can be carried out, or it can shade.

[0014] In this invention, a beam-of-light reflecting layer, a beam-of-light shielding layer, etc. may be prepared in a part of \*\*\*\* which constitutes the concave protruding line 5, and after those layers allocated-type-form a concave protruding line, they can be formed. For example, a reflecting layer is formed by giving a smooth coat to a predetermined field with the means of vacuum evaporatono, sputtering, sublimation, a spray, etc. In the case of vacuum deposition, partial vacuum evaporatono can be performed by technique, such as slanting vacuum evaporatono and vacuum evaporatono which used the louver. Moreover, it is also possible to begin vacuum deposition, to perform reflecting layers including other technique over the whole concave convex, to decompose or deteriorate the coat which irradiates the plasma, ultraviolet rays, an electron ray, etc. from a suitable direction after an appropriate time, and is in a specific field, and to remove by sublimation, the dissolution; etc.

[0015] Moreover, in this invention, the concave protruding line 5 can be formed in both sides of a base material 2 by supplying again, the film base material 2 which formed the concave protruding line 5 in one side

if needed, so that this concave protruding line agenesis side may contact the 1st page of a roll intaglio, and passing the same production process as the above. Thus, when forming the concave protruding line 5 in both sides of a base material, the 2nd roll intaglio is installed back and manufacture with the sufficient effectiveness which continued by making the base material after exfoliating from the first roll intaglio supply to the 2nd roll intaglio as it is attained.

[0016] The light which carries out incidence penetrates the direction-selective beam-of-light adjustment sheet 4 obtained by this invention by whenever [ incident angle ], or extinction and the peculiar optical effectiveness of being colored, shaded and reflected are acquired. Therefore, from the aperture of the multi-story building which is in the neighborhood, although a sheet 4 adjusts the amount of lighting by being able to use for various applications, for example, sticking on the aperture of a house and the outdoors of the house or its indoor situation can be seen from the interior of a room or the outside yard with the include angle to see, it can cover so that the indoor appearance of a lower house cannot be seen. Moreover, although the contents of a display of a display can be checked by looking by sticking on a Braun-tube front face as an anti-dazzle sheet of a display, the incident light from the electric light of indoor head lining can be used so that it may not reflect and be visible. Furthermore, by sticking on the front face of the instruments of an automobile, visibility can be raised, or it can stick on a windshield and side glass and can use as lighting accommodation or a protection-from-light sheet. In addition, if it uses as the transparency mold used for a movie, projection mold television, etc., or a reflective mold projection screen, only a projection image can be penetrated or reflected efficiently, the diffused light which carries out incidence to a screen at an include angle different from a projection beam of light can be absorbed and attenuated, and it will become the projection screen equipped with the good visible property.

[0017] Next, a concrete example is given and this invention is further explained to a detail.

The beam-of-light adjustment concave protruding line which becomes one side of a polyethylene terephthalate film with an example 1 thickness of 38 micrometers from a detailed parallel-curves pattern with 50 micrometers of protruding line \*\*\*\*, 100 micrometers [ of concave streak \*\*\*\* ], and a concave protruding line height of 200 micrometers on a following component and following conditions using the equipment of a mode which was illustrated to drawing 1 was formed.

- Roll intaglio -- The version crevice was formed by the etching method.
- Resin -- Unsaturated polyester system ultraviolet curing mold resin (viscosity of 3000cps / 25-degreeC) is used.
- Exposure conditions -- Ultraviolet rays are irradiated with black light 2 LGT of output 160W.
- Base material rate -- After dyeing the concave protruding line formed on the base material black using a disperse dye by the 30 m/min following \*\*, adhesion processing was performed to the film rear face, and the direction-selective beam-of-light adjustment sheet as an object for \*\*\*\*\* was obtained. When this sheet was stuck and observed in the aperture of a general residence, from the upper-layers story of the high-rise building on the outdoors, an indoor situation could not be seen by being covered with a sheet, but, on the other hand, the outdoor scene was able to be seen from the interior of a room. It has checked that the optical effectiveness of directional selectivity was acquired by this.

[0018] As shown in example 2 drawing 5 , on one side of the film base material 2 of 25-micrometer polyethylene terephthalate film in thickness Concave protruding line 5c which consists of a lenticular lens which made the semicircle column with which the width of face (diameter) of heights 9 consists of a cross-section hemicycle which is 50 micrometers arrange in parallel without a clearance is formed. moreover, 5d of concave protruding lines which consist of a Fresnel lens of a gestalt as which this base material 2 resembles on the other hand, and the reflected light (from the reflecting layer mentioned later) is completed toward the concave protruding line 5c side of a lenticular lens was formed. In addition, it is a detailed concave convex for lusterless to the peripheral surface from the film base material 2 side of the heights 9 which constitute the lenticular lens of concave protruding line 5c to 60 degrees. (split face) 10 was prepared. Moreover, the track group which makes the cross-section configuration like illustration arranges a Fresnel lens to concentric circular, and the gestalt which inclined so that it might moreover apply to a periphery (left-hand side in drawing) from a core (drawing Nakamigi side) and the height of a track group might become low gradually is made. Each concave protruding line which consists of this lenticular lens and Fresnel lens was formed on a following component and following conditions using equipment which was illustrated to drawing 1 .

- Roll intaglio -- The roll intaglio which gave chrome plating was used for the copper printing plate which formed the shape of toothing for a lenticular lens or Fresnel lens Chinese poem types (version crevice)

with electroforming.

- Resin -- Urethane acrylate prepolymer (viscosity of 2000cps / 25-degreeC).
- Exposure conditions and base material rate -- It is the same as an example 1.

Subsequently, after vapor-depositing chromium to concave protruding line 5d page up [ which consists of a Fresnel lens ] and forming a reflecting layer 14, 5d side of concave protruding lines of the film base material 2 was pasted up on the Pori chlorination vinyl sheet (plasticizer: 20phr) 12 with a thickness of 150 micrometers with adhesives 13 (urethane system adhesives of an isocyanate bridge formation mold), and the beam-of-light adjustment sheet used as an object for reflective mold projection screens was produced. Thus, according to the obtained above-mentioned sheet (projection screen), diffuse reflection of the projection image beam of light which carries out incidence from a transverse plane (the near direction of a normal) is carried out by optical operation of a lenticular lens and a Fresnel lens with a high reflection factor as it is. On the other hand, the diffused lights (daylight, light of an electric light, etc.) of the exterior which carries out incidence will scatter about and disappear in the lusterless section (split face 10) of a lenticular lens from the direction of [ other than a transverse plane ]. Consequently, the contrast of a projection image will become good.

[0019]

[Effect of the Invention] Since the hardening Chinese poem type of the ionizing-radiation hardening mold resin is carried out within a roll intaglio and the concave protruding line for beam-of-light adjustment which consists of a detailed \*\*\*\* pattern in a direction-selective beam-of-light adjustment sheet is formed on a film base material like the above, as explained above, Compared with the etching method or the conventional technique which heaped up and had adopted print processes, the beam-of-light adjustment sheet equipped with the concave protruding line by which the always faithful and very clear version configuration was reproduced to the version crevice of an intaglio can be obtained. The beam-of-light adjustment sheet of high quality can be manufactured more simple and quickly by in addition to formation of this highly precise concave protruding line, coloring it this concave protruding line suitably, and adopting the roll intaglio which makes the field of at least 1 county a split face at allocated type formation and coincidence of this concave protruding line. Moreover, especially, there is no complicated process, and since the continuous manufacture is

possible, there is an advantage which is suitable for mass production, as a result manufacture effectiveness is not only good, but can attain cost reduction-ization of a product.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The process explanatory view showing one example of this invention manufacture approach.

[Drawing 2] The sectional view showing an example of a direction-selective beam-of-light adjustment sheet.

[Drawing 3] The sectional view showing other examples of a direction-selective beam-of-light adjustment sheet.

[Drawing 4] The flat-surface explanatory view showing the example of representation of the track group pattern of a beam-of-light adjustment concave protruding line.

[Drawing 5] The sectional view showing the direction-selective beam-of-light adjustment sheet obtained in the example 2.

[Description of Notations]

1 Roll Intaglio

2 Film Base Material

3 Ionizing-Radiation Hardening Mold Resin

4 Direction-selective Beam-of-Light Adjustment Sheet

5 Concave Protruding Line for Beam-of-Light Adjustment

5a The colored concave protruding line for beam-of-light adjustment

5b The concave protruding line for beam-of-light adjustment which has the rough disadvantage part from which an optical property differs

6 Version Crevice

10 Split Face

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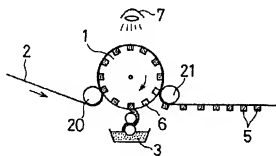
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(54)【発明の名称】 方向選択性光線調整シートの製造方法

(57)【要約】 (修正有)

【目的】 フィルム基材上に、各種線部パターンからなる光線調整用凹凸条を設けた方向選択性光線調整シートを精度よく且つ迅速容易に製造する。

【構成】 光線調整用凹凸条 5 を、該凹凸条の断面用形状からなる版凹部 6 を形成したロール凹版 1 を使用し、該ロール凹版の版凹部 6 に電離放射線硬化型樹脂 3 を充填させると共にフィルム基材 2 を接触させ、該基材が凹版に接触している間に電離放射線 7 を照射して基材と凹版の間に介在している上記樹脂を硬化させて該樹脂と基材とを密着せしめた後、硬化した樹脂が密着した基材を凹版から剥離し、ついで形成された凹凸条に着色を施す。



- 1 : ロール凹版
- 2 : フィルム基材
- 3 : 電離放射線硬化型樹脂
- 5 : 光線調整用凹凸条
- 6 : 版凹部



## 【特許請求の範囲】

【請求項1】 フィルム基材上に、着色された微細な平行直線群又は平行曲線群若しくはそれらを組み合わせた線群からなる光線調整用凹凸条を設けた方向選択性光線調整シートを製造する方法であって、上記光線調整凹凸条の彫形用形状からなる版凹部を形成したロール凹版を使用し、該ロール凹版の少なくとも版凹部に電離放射線硬化型樹脂を充填させると共にフィルム基材を接触させ、該基材が凹版に接触している間に電離放射線を照射して基材と凹版の間に介在している上記樹脂を硬化させて該樹脂と基材とを密着せしめた後、硬化した樹脂が密着した基材を凹版から剥離し、次いで基材上に形成された凹凸条に着色を施すことにより製造することを特徴とする方向選択性光線調整シートの製造方法。

【請求項2】 フィルム基材上に、着色された微細な平行直線群又は平行曲線群若しくはそれらを組み合わせた線群からなる光線調整用凹凸条を設けた方向選択性光線調整シートを製造する方法であって、上記光線調整凹凸条の彫形用形状からなる版凹部を形成したロール凹版を使用し、該ロール凹版の少なくとも版凹部に着色剤含有の電離放射線硬化型樹脂を充填させると共にフィルム基材を接触させ、該基材が凹版に接触している間に電離放射線を照射して基材と凹版の間に介在している上記樹脂を硬化させて該樹脂と基材とを密着せしめた後、硬化した樹脂が密着した基材を凹版から剥離することにより製造することを特徴とする方向選択性光線調整シートの製造方法。

【請求項3】 フィルム基材上に、少なくとも光学的特性の異なる粗面部分を有する微細な平行直線群又は平行曲線群若しくはそれらを組み合わせた線群からなる光線調整用凹凸条を設けた方向選択性光線調整シートを製造する方法であって、上記光線調整凹凸条を彫形するため少なくとも微細凹凸面を有する形状からなる版凹部を形成したロール凹版を使用し、該ロール凹版の少なくとも版凹部に電離放射線硬化型樹脂を充填させると共にフィルム基材を接触させ、該基材が凹版に接触している間に電離放射線を照射して基材と凹版の間に介在している上記樹脂を硬化させて該樹脂と基材とを密着せしめた後、硬化した樹脂が密着した基材を凹版から剥離することにより製造することを特徴とする方向選択性光線調整シートの製造方法。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は、入射する方向により入射光の透過又は反射の度合いやその状態が変化する方向選択性透過シートの製造方法に関する。

## 【0002】

【従来の技術及び発明が解決しようとする課題】 入射する光線の角度によつて、その入射光が反射や吸収され、或いは透過されて様々な調整される方向選択性光線調整

材料として以下のようなものが知られている。例えば、液晶を利用して構成してなり該液晶分子の軸方向を電界で調整することにより偏光特性を持たせたものや、多数枚の透明シートと着色シートを交互に積層させた積層層を積層方向にスライスすることにより得られる材料がある。しかし、前者は高価で、その利用法も複雑であつて汎用性に欠け、また透明電極等が必要となるための煩雑な加工等が必要である。また後者のものは製造工程が複雑で、特に積層作業に手間取り、またスライス面をきれいにするための表面処理加工等が必要となり、高価なものとなるを得なかった。そのため、光線を調整するための凹凸形状をフィルム基材に設けた簡易構造の光線調整材料も提案されている。具体的には、フィルム基材に感光性樹脂を全面に塗布した後、その塗布面上に網模様のネガスクリーンを設置した状態で紫外線を照射し、紫外線が照射されず未硬化の感光性樹脂部分を洗い流して除去してから、硬化した樹脂部分のみを着色したものである。しかし、これは上記した透明シートと着色シートを積層したものをスライスして得られる材料に比べて製造工程が簡略化されるものの、未硬化の樹脂部分を洗浄除去する等の煩雑な工程が依然として残り、また硬化した樹脂部分からなる凹凸の形状が精度的に満足できるものではない等の懸点がある。その他にも、フィルム基材にグラビア印刷、スクリーン印刷等の盛り上げ印刷手段により着色した凹凸形状を設けた材料がある。これは製造が容易であるが、印刷時に基材に転移したインキのレベリングが生じるため、最終的に得られる凹凸形状が不定形となり、所望の凹凸形状が精度良く得られず、その結果、方向選択性の効果が安定して充分に得られない問題があつた。本発明は上記従来技術の欠点に鑑みながら、また、フィルム基材に光線調整用凹凸条を設けた構造の方向選択性光線調整材料を製造する方法として、特に、その凹凸を簡便に且つ高精度に形成することができ、上、全体的にも迅速容易に量産することができる方向選択性光線調整シートの製造方法を提供することを目的とする。

## 【0003】

【課題を解決するための手段】 本発明の方向選択性光線調整シートの製造方法は、フィルム基材上に、着色された微細な平行直線群又は平行曲線群若しくはそれらを組み合わせた線群からなる光線調整用凹凸条を設けた方向選択性光線調整シートを製造する方法であつて、上記光線調整凹凸条の彫形用形状からなる版凹部を形成したロール凹版を使用し、該ロール凹版の少なくとも版凹部に電離放射線硬化型樹脂を充填させると共にフィルム基材を接触させ、該基材が凹版に接触している間に電離放射線を照射して基材と凹版の間に介在している上記樹脂を硬化させて該樹脂と基材とを密着せしめた後、硬化した樹脂が密着した基材を凹版から剥離し、次いで基材上に形成された凹凸条に着色を施すことにより製造すること

を特徴とするものである。また本発明製造方法は着色された光線調整用凹凸条を設ける方向選択性光線調整シートを製造する場合、その着色を上記製造方法の着色手段に代えて、版凹部に充填させる電離放射線硬化型樹脂として着色剤を含有させたものを適用して行なうことを特徴とするものである。更に本発明製造方法は、フィルム基材上に、少なくとも光学的特性の異なる粗面部分を有する微細な平行直線群又は平行曲線群若しくはそれらを組み合わせた線群からなる光線調整用凹凸条を設けた方向選択性光線調整シートを製造する方法であって、上記光線調整凹凸用条を成形するため少なくとも微細凹凸面を有する形状からなる版凹部を形成したロール凹版を使用し、該ロール凹版の少なくとも版凹部に電離放射線硬化型樹脂を充填させると共にフィルム基材を接触させ、該基材が凹版に接触している間に電離放射線を照射して基材と凹版の間に介在している上記樹脂を硬化させて該樹脂と基材とを密着せしめた後、硬化した樹脂が密着した基材を凹版から剥離することにより製造することを特徴とするものである。

【０００４】

【実施例】以下、本発明の実施例を図面にに基づき説明する。図１は本発明製造方法の一例を示す工程説明図であり、図中１はロール凹版、２はフィルム基材、３は電離放射線硬化型樹脂を示す。図２に本発明方法により得られる方向選択性光線調整シート４の一例を示し、該光線調整シート４は基本的にフィルム基材２と光線調整用凹凸条５から構成される。本発明方法はまず、方向選択性光線調整シートにおける光線調整用凹凸条５を成型形成するための形状からなる版凹部６を型取りしたロール凹版１を準備し、例えば図示の如く設置して使用する。図中２０と２１はロール凹版１と対に設置される押圧ロールと送りロールであり、両ロールともクリアランス調整等が可能となっている。

【０００５】次いで、上記ロール凹版１に対して適宜移送手段にてフィルム基材２を、該凹版面に当接するように供給する。これと同時に、電離放射線硬化型樹脂３を凹版１の少なくとも凹部６に充填すべく適宜手段により供給する。そして、基材２が凹版１に接触している間に電離放射線照射装置７により電離放射線を照射して基材２と凹版１の間に介在している上記樹脂を硬化させると同時に基材側に密着せしめる。しかる後、硬化した樹脂が密着した基材２を凹版１から剥離する。この剥離により、基材２上にロール凹版１にて彫刻された光線調整用凹凸条５が形成される。そして基材２上に設けられた凹凸条５に対して着色を施すことにより、図２の如き着色された光線調整用凹凸条５ａを備えた方向選択性光線調整シート４が得られる。なお凹凸条５は図２（Ａ）に例示の如く凹部８に薄い樹脂層があるように形成しても、或いは図４（Ｂ）に例示の如く凹部８には樹脂層が全くないように形成してもよい。

【０００６】凹凸条５の着色は、染料等により染色したり、凹凸条の面上に適宜塗布手段にて着色層を設けることによって行なわれる。染料としてはオイル染料、分散染料、カチオン染料、反応性染料、直接染料などが使用される。また本発明方法では凹凸条５の着色を上記の着色手段に代えて、公知の顔料、染料等を含有させた電離放射線硬化型樹脂を用い、その樹脂をロール凹版に供給することにより凹凸条の成型形成と同時に行う。後者の着色方法の場合、着色が凹凸条の成型形成と同時に行なわれるため簡単であり、しかも生産効率の点でも有利である。この凹凸条５の着色内容は通常、フィルム基材２の色と異なるように行なわれるが、それ以外に凹凸条の中において互いに異なる色又は異なる濃度となるように適宜配色して行ってもよい。

【０００７】図２に例示したような基材２と異なる色に着色した凹凸条５ａを備えた光線調整シート４によれば、例えば基材２が透明で透過用シートとして使用する態様の場合、凹凸条の凹部８を直接透過する入射角度範囲内で入射した光Ｘは基材２を透過するそのまま裏面に透過し、一方、凹凸条の凸部９を通る入射角度範囲で入射する光Ｙはすべて着色され、また減光される。特に図２（Ｂ）の如き凹部８に樹脂層がない凹凸条５ａを設けた光線調整シート４の方が、方向による光線の変動コントロールが良く好ましい。

【０００８】本発明は、ロール凹版１として一部に微細凹凸面を備えた版凹部６を型取りしたものを適用して同様の操作を行うことにより、図３に示すように他の面部分と光学的特性が異なる粗面１０を有する光線調整用凹凸条５ｂを備えた方向選択性光線調整シート４が得られる。これは凹凸条５を構成する複数の面群のうち、少なくとも一群の面を粗面とする凹凸条を備えた光線調整シートを製造する際に適用される。図３に例示したような粗面１０を設けた凹凸条５ｂを備えた光線調整シート４によれば、例えば基材２が透明で透過用シートとして使用する態様の場合、凹凸条の粗面１０を通過する入射角度範囲内で入射した光Ｐは粗面に於いて乱反射されるため減光され、一方、凹凸条の粗面１０以外の面１１を通り入射角度範囲内で入射する光Ｑは反射されるものもあるが、その殆どは基材２を透過するそのまま裏面に透過する。なお凹凸条５ｂの断面形状は、図３に例示の如き三角形のものに限らず、四角形以上の多角形状や、半円形状や半楕円形状などであってもよい。

【０００９】本発明方法ではいずれの態様の場合も上記凹凸条５の形成を基本的に上述のような製造（成型）手段にて行っているため、ロール凹版に型取りした形状を忠実に再現した極めて鮮明な凹凸形状が得られ、特に凹凸形状が複雑で微細な形状のものであっても簡便に且つ確実に得ることができる。また図２（Ａ）に例示の如き凸部９としての間（即ち凹部８）に樹脂層が存在する形態をなす凹凸条５は、ロール凹版の版凹部に供給される

電離放射線硬化型樹脂3が版凹部のみならず凹版の頂面と基材2の間に介在するように充填されることにより形成される。従って、図2(B)に例示の如き凹部8に樹脂層が全くない凹凸条5を形成する場合には、上記樹脂をロール凹版に供給した後、版凹部以外の版面上の樹脂をドクターブレードで掻き取る等の操作をして版凹部のみに樹脂を充填できればよい。

【0010】本発明に使用するロール凹版1における版凹部6の形成は、電子彫刻、エッチング法、ミル押し、電鍍法、数値制御(NC)旋盤やフライス盤等による旋盤加工法等の手段に行うことができる。版凹部6の形成は光線調整用凹凸条5の凹凸形状を彫刻する形状であって、実際には版の凹部部分が凹凸条の凸部を彫刻することになる。版材は銅、鉄等の金属や、合成樹脂等であり、必要に応じて表面にクロム等のメッキを施す。電離放射線硬化型樹脂の供給充填は、本実施例の如くロール凹版に直接ロールコート法にて供給して行う他、Tダイ法等のダイから供給したり、基材2がロール凹版1に当接する前に該基材上に予めロールコート法等にて塗布形成することにより行ってもよい。

【0011】上記電離放射線硬化型樹脂としては、分子中に重合性不飽和結合やエポキシ基を有するプレポリマー又は単量体からなるもので、ウタンアクリレート、ポリエステルアクリレート、エポキシアクリレート等をはじめとする、公知の紫外線又は電子線硬化型樹脂を使用できる。中でも溶剤タイプのものを使用すれば硬化による体積収縮、形状変形、気泡発生等の不具合が生じることなく、該樹脂の予備乾燥工程が不要となる上、より再現性良好な凹凸条が確実に得られ易くなる。また照射する電離放射線はフィルム基材2が透明である場合には紫外線を使用することができるが、該基材が不透明である場合には電子線を使用することが必要である。またロール凹版を電離放射線透過性材料にて構成すれば、該凹版内部に設置した照射装置からの照射が可能となる。電子線を使用する場合、その照射量はシート基材の厚み、材質等にもより異なるが通常0.5〜30Mrad程度が好ましい。

【0012】フィルム基材2としては、ポリエチレンテレフタレート等のポリエステル、ナンロン等のポリアミド、ポリ塩化ビニル、ポリメタクリル酸メチル等のアクリル樹脂、ポリカーボネート、ポリスチレン、ポリアリレート、フッ素系樹脂、ポリプロピレン、三酢酸セルロース、セロファン、ポリ塩化ビニル等の合成樹脂からなるフィルムが挙げられる。基材2は透過シートとして用いる場合には無色透明のものを通常用いるが、着色透明のものであってもよい。また反射シートとして用いる場合の基材2としては、基材樹脂にチタン白等の高反射性の隠蔽性顔料を添加して成形したものや、或いは、フィルム面に金属蒸着層を形成したもの、更には酸化チタン被覆雲母等のパール顔料又は金属粉末顔料等の光輝性

顔料入りの塗料を塗工形成したものをを用いる。基材2の厚さ、着色等の条件は凹凸条5に付与する光学的要素等の兼ね合いで適宜選定する。

【0013】凹凸条5の断面形状はいずれの態様の場合でも特に限定されないが、透過率又は反射率の方向選択性による光学的効果を確実に得るとする観点からすると基材2の表面に対して異なる角度を有する複数の面群から構成される形態のものが好ましい。具体的には三角形、四角形、台形、それ以上の多角形その他、円、楕円等が挙げられる。これらの凹凸形状は規則的なものが好ましいが、不規則なものであってもよい。また凹凸条5を構成する線群は、その平面図が図4(a)に例示の如き微細な平行直線群や、図4(b)に例示の如き微細な平行曲線群や、或いはそれらを適宜組合せた図4(c)に例示の如き線群のものである。平行曲線群は円状のものに限らず、正弦波等の波状平行曲線等であってもよい。また図4(c)に例示の線群は平行曲線群どうしを組み合わせる格子状にしたものであるが、この組合せた線群としては平行直線群と平行曲線群との組合せのもの、或いは平行曲線群どうしを組み合わせたものも可能である。例えば、図4(a)の如き線群では図面における左右方向から斜めに入る入射光を減光(着色)したり透光することができる。また図4(b)の如き線群では図面に対して垂直方向からの入射光のみをそのまま透過させることができる。更に図4(c)の如き線群では図面における左右・上下方向から斜めに入る入射光を減光(着色)したり透光することができる。

【0014】本発明では、凹凸条5を構成する面群の一部に光線反射層、光線遮断層等を設けてもよく、それらの層は凹凸条を成型形成した後形成することができる。例えば、反射層は蒸着、スパッタリング、昇華、スプレー等の手段により平滑な被膜を所定の面に与えることにより形成される。蒸着法の場合は斜蒸着など、ルーバを用いた蒸着などの手法により部分的な蒸着を行うことができる。また蒸着法をはじめ他の手法も含め、反射層を凹凸面全体にわたって行い、しる後、適当な方向からプラズマ、紫外線、電子線などを照射して特定の面にある被膜を分解又は変質させ、昇華や溶解などにより除去することも可能である。

【0015】また本発明では必要に応じ、片面に凹凸条5を設けたフィルム基材2を再度、該凹凸条非形成面がロール凹版1面に当接するように供給して上記と同様の製造工程を通過させることにより、基材2の両面に凹凸条5を形成することができる。このように凹凸条5を基材の両面に設ける場合は、第2ロール凹版を後方に設置しておき、最初のロール凹版から剥離した後の基材をそのまま第2ロール凹版へ供給させることにより連続した効率よい製造が可能となる。

【0016】本発明により得られる方向選択性光線調整シート4は、入射する光が入射角度によって透過した

り、減光、着色、遮光、反射されるという独特の光学的効果が得られる。そのためシート4は各種用途に利用でき、例えば、家庭の窓に貼り付けることにより採光量を調節したり、また見る角度によって室内又は外庭からはその家の屋外又は室内の様子が見えるが、近所にある高層建築物の窓からはその家の室内の様子が見えないように遮蔽することができる。またディスプレイの防眩シートとして、ブラウン管表面に貼ることによってディスプレイの表示内容は視認できるが、室内天井の電灯からの入射光は反射して見えないように利用することができる。更に、自動車の計器類の表面に貼ることにより視認性を高めたり、或いはフロントガラス、サイドガラスに貼付して採光調節や遮光シートとして利用することができる。その他、映画や投影型テレビジョン等に用いる透過型又は反射型映写スクリーンとして用いると、映写像のみ効率よく透過又は反射させ、映写光線とは別の角度でスクリーンに入射する散光を吸収して減衰させることができ、良好な可視特性を備えた映写スクリーンとなる。

【0017】次に、具体的な実施例を挙げて本発明を更に詳細に説明する。

#### 実施例1

厚さ38 $\mu\text{m}$ のポリエチレンテレフタレートフィルムの片面に、図1に図示したような態様の装置を使用し下記の構成材料および条件にて、凸部幅50 $\mu\text{m}$ 、凹部幅100 $\mu\text{m}$ 、凹凸高さ200 $\mu\text{m}$ の微細な平行曲線パターンからなる光線調整凹凸部を形成した。

- ・ロール凹版…エッチング法にて版凹部を形成した。
- ・樹脂…不飽和ポリエステル系紫外線硬化型樹脂（粘度3000cps/25°C）を用いる。
- ・照射条件…出力160Wの紫外線照射装置2灯にて紫外線を照射。
- ・基材速度…30m/min

次いで基材上に形成した凹凸部を分散染料を用いて黒色に染色した後、フィルム裏面に粘着加工を施し、窓貼り用としての方向選択性光線調整シートを得た。このシートを一般住宅の窓に貼り付けて観察したところ、屋外にある高層建物の高層階からはシートにより遮蔽されることによって屋内の様子を見ることができず、一方室内からは屋外の景色を見ることができた。これにより方向選択性の光学的効果が得られることを確認できた。

#### 【0018】実施例2

図5に示すように、厚さ25 $\mu\text{m}$ ポリエチレンテレフタレートフィルムのフィルム基材2の片面に、凸部9の幅（直径）が50 $\mu\text{m}$ の断面半円形からなる半円柱を間隔なく平行に配列させたレンチキュラーレンズからなる凹凸部5cを形成し、また該基材2の他面にレンチキュラーレンズの凹凸部5c側に向かって（後述する反射層からの）反射光を収束させるような形態のフレネルレンズからなる凹凸部5dを形成した。なお凹凸部5cのレン

チキュラーレンズを構成する凸部9のフィルム基材2側から60°までの周面に艶消し用の微細凹凸面（粗面）10を設けた。またフレネルレンズは図示の如き断面形状をなす線群が同心円状に配列し、しかも中心（図中右側）から外周（図中左側）にかけて線群の高さが徐々に低くなるよう傾斜した形態をなしている。このレンチキュラーレンズ及びフレネルレンズからなる凹凸部はいずれも図1に図示したような装置を用い、下記の構成材料および条件にて形成した。

- ・ロール凹版…電鍍法でレンチキュラーレンズ又はフレネルレンズ賦型用の凹凸形状（版凹部）を形成した銅製の版面にクロムメッキを施したロール凹版を使用した。
- ・樹脂…ウレタンアクリレートプレポリマー（粘度2000cps/25°C）。
- ・照射条件及び基材速度…実施例1と同じ。

次いで、フレネルレンズからなる凹凸部5d面上にクロムを蒸着して反射層14を設けた後、フィルム基材2の凹凸部5d側を、厚さ150 $\mu\text{m}$ のポリ塩化ビニルシート（可塑剤：20phr）12に接着剤13（イソシアネート架橋型のウレタン系接着剤）により接着し、反射型映写スクリーン用として使用する光線調整シートを作製した。このようにして得られた上記シート（映写スクリーン）によれば、正面（法線方向近傍）方向から入射する映写像光線はそのままレンチキュラーレンズ及びフレネルレンズの光学的作用により高反射率で拡散反射される。一方、正面以外の方向から入射する外部の散光（日光、電燈の光など）はレンチキュラーレンズの艶消部（粗面10）で散乱、消失してしまふ。その結果、映写像のコントラストが良好なものとなる。

#### 【0019】

【発明の効果】以上説明したように、方向選択性光線調整シートにおける微細な線群パターンからなる光線調整用凹凸部を、前記の如く電鍍放射線硬化型樹脂をロール凹版内にて硬化賦型させてフィルム基材上に形成しているため、エッチング法や盛り上げ印刷法を採用していた従来技術に比べ、凹版の版凹部に対して常に忠実に極めて鮮明な版形状が再現された凹凸部を備えた光線調整シートを得ることができる。この高精度な凹凸部の形成に加え、該凹凸部に適宜着色を施したり、また該凹凸部の賦型形成と同時に少なくとも一部の面を粗面とするロール凹版を採用することにより、より高品質の光線調整シートを簡便かつ迅速に製造できる。また特に煩雑な工程がなく、また連続した製造が可能であるため、製造効率がよいためだけでなく、量産に適し、ひいては製品のコスト低減化を図ることができる利点がある。

【図面の簡単な説明】

【図1】本発明製造方法の一実施例を示す工程説明図。

【図2】方向選択性光線調整シートの一例を示す断面図。

【図3】方向選択性光線調整シートの他の例を示す断面

図。

【図 4】光線調整凹凸条の線群パターンの代表例を示す平面説明図。

【図 5】実施例 2 で得られた方向選択性光線調整シートを示す断面図。

【符号の説明】

- 1 ロール凹版  
2 フィルム基材

- 3 電離放射線硬化型樹脂  
4 方向選択性光線調整シート

- 5 光線調整用凹凸条

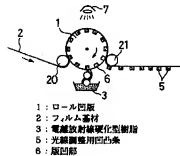
- 5 a 着色された光線調整用凹凸条

- 5 b 光学的特性が異なる粗損部分を有する光線調整用凹凸条

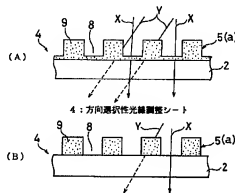
- 6 版凹部

- 10 粗面

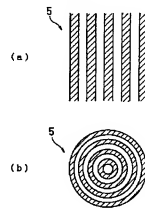
【図 1】



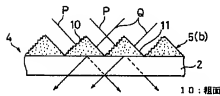
【図 2】



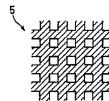
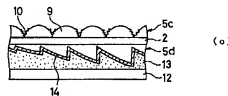
【図 4】



【図 3】



【図 5】



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